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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/612,149	07/03/2003	Takeshi Masuda	026390-00009	3313
4372	7590	03/22/2010	EXAMINER	
ARENT FOX LLP 1050 CONNECTICUT AVENUE, N.W. SUITE 400 WASHINGTON, DC 20036			ZERVIGON, RUDY	
			ART UNIT	PAPER NUMBER
			1792	
			NOTIFICATION DATE	DELIVERY MODE
			03/22/2010 ELECTRONIC	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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### Office Action Summary

**Application No.**

10/612,149

**Applicant(s)**

MASUDA ET AL.

**Examiner**

Rudy Zervigon

**Art Unit**

1792

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 December 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3-6,8-11 and 13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-6,8-11 and 13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 April 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB08)
- Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1, 3, and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Horiike; Yasuhiro et al. (US 6155200 A). Horiike teaches a film-forming apparatus (Figure 2; column 6; lines 33-64) comprising a gas-mixing chamber (volume above 16; Figure 2; column 6; lines 33-64) for admixing a raw gas (9; Figure 2; column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61) and a reactive gas (9; Figure 2; column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61); a film-forming chamber (1; Figure 2; column 6; lines 33-64) connected to the gas-mixing chamber (volume above 16; Figure 2; column 6; lines 33-64), a circular\* shower head (18; Figure 2; column 6; lines 33-64) disposed on the top face of the film-forming chamber (1; Figure 2; column 6; lines 33-64) and having a plurality of gas-injection holes (19; Figure 2) defined therethrough; a stage (2; Figure 2; column 6; lines 33-64) for placing thereon a substrate (W; Figure 2; column 6; lines 33-64) to be processed, the stage (2; Figure 2; column 6; lines 33-64) being disposed inside the film-forming chamber (1; Figure 2; column 6; lines 33-64) and movable in an up and down (3; Figure 2; column 6; lines 33-64) manner; an exhaust port (14; Figure 2; column 6; lines 33-64) for discharging an exhaust gas (used “process gas”) from inside the film-forming chamber (1; Figure 2; column 6; lines 33-64) to outside of the film-forming chamber (1; Figure 2; column 6; lines 33-64), the exhaust port (14; Figure 2; column 6; lines 33-64) being formed though a wall surface of the film-forming chamber (1; Figure 2; column 6; lines 33-64) in a position below the stage (2; Figure 2; column 6; lines 33-

64) at a time of film formation, the exhaust gas (used “process gas”) generated in a space defined by the shower head (18; Figure 2; column 6; lines 33-64) and an upper face of the stage (2; Figure 2; column 6; lines 33-64) is discharged out of the exhaust port (14; Figure 2; column 6; lines 33-64) through a clearance (clearance between 2/3 and 1; Figure 2) between a side wall of the film-forming chamber (1; Figure 2; column 6; lines 33-64) and the stage (2; Figure 2; column 6; lines 33-64); and a gas mixture (column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61) prepared in the gas-mixing chamber (volume above 16; Figure 2; column 6; lines 33-64) being introduced into the film-forming chamber (1; Figure 2; column 6; lines 33-64) through the shower head (18; Figure 2; column 6; lines 33-64), thereby forming a film on the substrate to be processed, wherein a gas mixture (column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61) supply port (outlet portion of 75a,b that interface at 7b; Figure 7) in fluid communication between the gas-mixing chamber (volume above 16; Figure 2; column 6; lines 33-64) and the shower head (18; Figure 2; column 6; lines 33-64) is located on a radially extending line of the shower head (18; Figure 2; column 6; lines 33-64), and wherein the gas mixture (column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61) supply port (outlet portion of 75a,b that interface at 7b; Figure 7) is constructed and arranged such that the gas mixture (column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61) to be supplied from the gas-mixing chamber (volume above 16; Figure 2; column 6; lines 33-64) flows in a direct contact with, and only from outside a circumferential outer perimeter of, the upper surface of the shower head (18; Figure 2; column 6; lines 33-64) and the gas-injection holes (19; Figure 2) toward a central portion along the upper surface of the shower head (18; Figure 2; column 6; lines 33-64), as claimed by claim 1. Applicant’s claim requirements directed

to film deposition are intended use claim requirements in the pending apparatus claims. Horiike notes that his apparatus is used for both etching and deposition (column 1; lines 10-17). Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Horiike further teaches:

- i. The film-forming apparatus (Figure 2; column 6; lines 33-64) as set forth in claim 1, wherein when the flow rate of the gas mixture (column 3; lines 50-52 - "etching, and the diluent gas"; column 6; lines 54-61) is large, the shower conductance is small and the gas mixture (column 3; lines 50-52 - "etching, and the diluent gas"; column 6; lines 54-61) is injected into the film-forming chamber (1; Figure 2; column 6; lines 33-64) from the central portion of the shower head (18; Figure 2; column 6; lines 33-64) upon the formation of the film, wherein the shower head (18; Figure 2; column 6; lines 33-64) has a relatively large diameter, that the distance between the shower head (18; Figure 2; column 6; lines 33-64) and the substrate (W; Figure 2; column 6; lines 33-64) to be processed is increased or that the shower head (18; Figure 2; column 6; lines 33-64) having a the relatively large diameter is used and the distance between the shower head (18; Figure 2; column 6; lines 33-64) and the substrate (W; Figure 2; column 6; lines 33-

64) to be processed is increased, to thus prevent the central gas injection of the gas mixture (column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61) and to make the manner of a gas injection of the gas mixture (column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61) uniform, as claimed by claim 3. The entirety of Applicant’s claim 3 is an intended use of the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

- ii. The film-forming apparatus (Figure 2; column 6; lines 33-64) as set forth in claim 1, wherein when the flow rate of the gas mixture (column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61) is small, the shower conductance is large and the gas mixture (column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61) is injected into the film-forming chamber (1; Figure 2; column 6; lines 33-64) from the shower head (18; Figure 2; column 6; lines 33-64) and into a region above the substrate (W; Figure 2; column 6; lines 33-64) to be processed from the periphery of the shower head (18; Figure 2; column 6; lines 33-64) upon the formation of the film, wherein the shower head (18; Figure 2; column 6; lines 33-64) has a relatively small diameter, that

the distance between the shower head (18; Figure 2; column 6; lines 33-64) and the substrate (W; Figure 2; column 6; lines 33-64) to be processed is reduced or that the shower head (18; Figure 2; column 6; lines 33-64) having the relatively small diameter is used and the distance between the shower head (18; Figure 2; column 6; lines 33-64) and the substrate (W; Figure 2; column 6; lines 33-64) to be processed is reduced, to thus prevent the peripheral gas injection of the gas mixture (column 3; lines 50-52 - "etching, and the diluent gas"; column 6; lines 54-61) and to make the manner of the gas injection of the gas mixture (column 3; lines 50-52 - "etching, and the diluent gas"; column 6; lines 54-61) uniform, as claimed by claim 4. The entirety of Applicant's claim 4 is an intended use of the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

***Claim Rejections - 35 USC § 103***

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 5, 6, 8, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Horiike; Yasuhiro et al. (US 6155200 A). Horiike does not teach the relative dimensions of

Horiike's showerhead (18; Figure 2; column 6; lines 33-64) diameter vs. Horiike's film forming chamber (1; Figure 2; column 6; lines 33-64) diameter as claimed by claims 5. Horiike does not teach the relative distance between Horiike's substrate (W) and Horiike's showerhead (18; Figure 2; column 6; lines 33-64). Horiike further does not teach the operating parameters of pressure and gas flow in the range of the claimed inequalities – claim 6, and 8-10.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to optimize Horiike's relative apparatus dimensions and Horiike's operating parameters.

Motivation to optimize Horiike's relative apparatus dimensions and Horiike's operating parameters is for improving plasma density, and subsequently processing uniformity, as taught by Horiike (column 1, line 66 – column 2, line 4). Further, it would be obvious to those of ordinary skill in the art to optimize the operation of the claimed invention (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990), MPEP 2144.05). Further it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art. (Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinchart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04)

5. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horiike; Yasuhiro et al. (US 6155200 A) in view of Reimer; Paul et al. (US 6817377 B1). Horiike is discussed above.



Horiike further teaches:

an exhaust port (14; Figure 2; column 6; lines 33-64) for discharging an exhaust gas (used “process gas”) from inside the film-forming chamber (1; Figure 2; column 6; lines 33-64) to outside of the film-forming chamber (1; Figure 2; column 6; lines 33-64) is formed though a wall surface of the film-forming chamber (1; Figure 2; column 6; lines 33-64) in a position below the stage (2; Figure 2; column 6; lines 33-64) at a time of film formation, the exhaust gas (used “process gas”) generated in a space defined by the shower head (18; Figure 2; column 6; lines 33-64) and an upper face of the stage (2; Figure 2; column 6; lines 33-64) is discharged out of the exhaust port (14; Figure 2; column 6; lines 33-64) through a clearance (clearance between 2/3 and 1; Figure 2) between a side wall of the film-forming chamber (1; Figure 2; column 6; lines 33-64) and the stage (2; Figure 2; column 6; lines 33-64); wherein a gas mixture (column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61) supply port (outlet portion of 75a,b that interface at 7b; Figure 7) is constructed and arranged such that the gas mixture (column 3; lines 50-52 - “etching, and the diluent gas”; column 6; lines 54-61) to be supplied from the gas-mixing chamber (volume above 16; Figure 2; column 6; lines 33-64) flows in a direct contact with, and only from outside a circumferential outer perimeter of, the upper surface of the shower head (18; Figure 2; column 6; lines 33-64) and the gas injection holes (19; Figure 2) toward a central portion along the upper surface of the shower head (18; Figure 2; column 6; lines 33-64) - claim 13.

Horiike does not teach a film-forming apparatus (Figure 2; column 6; lines 33-64), which comprises a load-lock chamber for stocking wafers conveyed from a wafer cassette in the atmospheric conditions; a film-forming chamber (1; Figure 2; column 6; lines 33-64); a conveyer

chamber positioned between the load-lock chamber and the film-forming chamber (1; Figure 2; column 6; lines 33-64) - claim 13.

Reimer teaches semiconductor processing apparatus (Figure 1) including a load-lock chamber (25c) for stocking wafers conveyed from a wafer cassette in the atmospheric conditions; a film-forming chamber (25a); a conveyer chamber (25b) positioned between the load-lock chamber (25c) and the film-forming chamber (25a).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Reimer's load-lock chamber (25c) and conveyer chamber (25b) to Horiike's apparatus.

Motivation to add Reimer's load-lock chamber (25c) and conveyer chamber (25b) to Horiike's apparatus is for process automation as taught by Reimer (column 1; lines 10-13).

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Horiike; Yasuhiro et al. (US 6155200 A) in view of Okase; Wataru (US 5,884,009 A). Horiike is discussed above. Horiike does not teach the film-forming apparatus (Figure 2; column 6; lines 33-64) as set forth in claim 1, wherein a gas ring is disposed at a periphery of the top face of the film-forming chamber (1; Figure 2; column 6; lines 33-64) so that an inert gas, which is not directly involved in the film formation, can uniformly be introduced into the film-forming chamber (1; Figure 2; column 6; lines 33-64) through the gas ring and along the inner surface of the side wall of the film-forming chamber (1; Figure 2; column 6; lines 33-64), as claimed by claim 11.

Okase is discussed in prior actions. Okase teaches the film-forming apparatus (Figure 7; column 15, lines 6-67) as set forth in claim 1, wherein a gas ring (76; Figure 7; column 14; lines 30-45) is disposed at a periphery of the top face of the film-forming chamber (volume within 7c+piece

containing 45; Figure 7; column 15, lines 6-67) so that an inert gas (77; Figure 7; column 15, lines 6-67), which is not directly involved in the film formation, can uniformly be introduced into the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67) through the gas ring (76; Figure 7; column 14; lines 30-45) and along the inner surface of the side wall of the film-forming chamber (volume within 7c+piece containing 45; Figure 7; column 15, lines 6-67), as claimed by claim 11.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Okase's gas ring (76; Figure 7; column 14; lines 30-45) to Horiike's apparatus.

Motivation to add Okase's gas ring (76; Figure 7; column 14; lines 30-45) to Horiike's apparatus is for preventing Horiike's chamber wall (1; Figure 2; column 6; lines 33-64) from chemical / physical deterioration as taught by Okase – "A purge gas is supplied into spaces between the first vessel and the second vessel to prevent the process gases from coming into contact with the first vessel made of a metal to prevent the corrosion of the first vessel." (abstract).

#### ***Response to Arguments***

7. Applicant's arguments with respect to all claims have been considered but are moot in view of the new grounds of rejection.

#### ***Conclusion***

8. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1792 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

/Rudy Zervigon/

Primary Examiner, Art Unit 1792